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## THE BRAIN-WEIGHT OF THE FILIPINO<sup>1</sup>

By MAXIMILIAN HERZOG

Determinations of the weight of the brain of the native Filipinos have not, so far as we know, heretofore been published. During his term of service as pathologist in the Bureau of Science in Manila, from 1904 to 1906, the author carefully weighed a number of brains of male individuals of this Malayan race. The post-mortem examinations during the course of which these determinations were made, were all of prisoners in Bilibid prison, the great jail and penitentiary of the Philippine islands, situated in the city of Manila. The cases selected for this study were full-blood natives who had died from various acute and chronic diseases; cases of half-breeds, or mestizos, were of course not included. It ought to be stated, however, that during the last three hundred years or more there has been an infusion of European, particularly Spanish, and also of Chinese blood into a considerable number of the natives, hence it is not always easy to say in a given case whether one is dealing with the absolutely pure native type or with an individual in whom there is a strain of foreign blood. Cases in which there has been clearly a foreign admixture are of course not included in our list, since they would not have escaped detection. On the whole, therefore, the table is based on male persons who would generally and without doubt be considered pure-blood native Filipinos.

The inmates of a great prison or penitentiary in the territory of one of the recognized civilized nations of the world include many individuals who may be fairly regarded as degenerates, hence the determination of the brain-weight of penitentiary prisoners might be open to some objections. Such objections however are not applicable in the case of the Filipino prisoners of Bilibid. Among the latter, at the time the following data were recorded, were numerous political prisoners who, long after the establishment of the Ameri-

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<sup>1</sup> Read at the Chicago meeting of the American Association for the Advancement of Science, Section H, January 2, 1908.

can civil government, had persisted in rebellion and hostility. There were also included many prisoners who had always led the life of *ladrones* in the more distant islands and mountainous districts, and who did not consider theft, robbery, or murder, for which they were finally imprisoned, any more criminal than did the feudal lords of ancient Japan or of medieval Europe regard their internecine wars or their ill-treatment of the persons or property of the serfs or subjects of their foes. In judging the material utilized it must be considered further that even such prisoners as were serving terms for theft, larceny, embezzlement, forgery, assault, manslaughter, or murder, cannot be regarded as degenerate in the sense of deviating to a great extent mentally and morally or possibly physically from the type of the society of which they form part. I do not want to be understood as insinuating that the great mass of the Filipino people are less moral and more criminal than the more highly civilized nations, but quite the contrary. Particularly where their original tendencies have not been spoiled by too intimate contact with western civilization, their morals on the whole are good, but as a race they are of course less mature in mental, moral, and ethical development; they are more childlike, and their power of inhibition is not strongly developed. Hence they succumb much more easily to temptation, and in contact with civilized institutions and relations they are more easily led astray than the more highly educated western individuals, therefore more frequently do they come in conflict with the law.

I am also confident from my observations made in Bilibid that very few, if any, of the several thousand native prisoners therein considered it a disgrace to be thus confined, and, what is more striking, very few natives beyond the prison walls look upon a term of detention with any such feeling. I may recount an incident which shows with what eyes a prisoner looks upon his striped uniform. Those who assisted me in the post-mortem work in the prison morgue were generally prisoners who had been detailed for service in the hospital. Among these, for several months, was a native Tagalog of Manila, of some twenty-odd years of age, who in 1901 and 1902 had been in the United States, spoke English well, was very neat in appearance, wrote a good hand, and was generally

well educated. One morning he informed me that he would leave the prison the next day, and asked as a special favor that I photograph him. I told the boy that I would take his picture the next day, after he had received his discharge. "O, no!" he said, "I want to be photographed in my prison suit, for I want to give the photograph as a souvenir to my mother and to keep one myself!" I duly photographed him in his convict garb and sent him in due time a couple of prints; later he personally came to the prison gate, at the hour when I usually arrived in the morning, and, holding his picture triumphantly up, thanked me with beaming face for the fine present I had made him! I therefore repeat that I am fully convinced that the brain material derived from among the Bilibid prisoners may fully claim to be considered as average specimens of the brains of full-blood native Filipinos.

In obtaining the brains and determining their weight the usual method in post-mortem examination was employed. The skull was opened by the customary circular incision, the dura was then split on both sides along the level of the opening of the skull, and its upper severed half was then removed. Next the cranial nerves were severed, and after freeing the cerebellum and lifting up the whole brain, a narrow bladed knife was so inserted into the foramen magnum that the cord could be cut beyond the medulla. The brain, including the cerebrum, cerebellum, pons, and medulla, was then lifted out and held up for a few minutes in order to drain the cerebrospinal fluid from the outer surfaces. The ventricles however were not opened, and the brain was weighed without attempting to remove the pia arachnoid. Most human brains have been weighed under the same conditions; only exceptionally has the pia arachnoid been removed. The scales and the weights used in these determinations had been tested with a set of weights standardized at Washington, D. C., and kept in the Philippine Bureau of Science. The set used in the prison morgue included weights of a minimum of 10 grammes. The figures given are correct to within 2 or 3 grammes. In all, 113 brains were examined, all from males who had died chiefly of tuberculosis, amebic dysentery, pneumonia, chronic malaria, beriberi, cerebrospinal meningitis, chronic nephritis, etc. The weights of these 113 brains are arranged in the following table from the lowest to the highest figure obtained.

<i>Grammes.</i>		<i>Grammes.</i>		<i>Grammes.</i>	
1.....	1,040	39.....	1,285	77.....	1,375
2.....	1,155	40.....	1,290	78.....	1,380
3.....	1,160	41.....	1,295	79.....	1,380
4.....	1,165	42.....	1,305	80.....	1,380
5.....	1,175	43.....	1,305	81.....	1,380
6.....	1,175	44.....	1,305	82.....	1,385
7.....	1,175	45.....	1,305	83.....	1,390
8.....	1,185	46.....	1,310	84.....	1,390
9.....	1,195	47.....	1,310	85.....	1,395
10.....	1,195	48.....	1,310	86.....	1,405
11.....	1,195	49.....	1,310	87.....	1,410
12.....	1,200	50.....	1,310	88.....	1,410
13.....	1,200	51.....	1,315	89.....	1,410
14.....	1,205	52.....	1,315	90.....	1,415
15.....	1,210	53.....	1,315	91.....	1,420
16.....	1,225	54.....	1,315	92.....	1,425
17.....	1,225	55.....	1,325	93.....	1,430
18.....	1,230	56.....	1,325	94.....	1,430
19.....	1,235	57.....	1,330	95.....	1,430
20.....	1,235	58.....	1,330	96.....	1,435
21.....	1,245	59.....	1,335	97.....	1,435
22.....	1,245	60.....	1,340	98.....	1,435
23.....	1,245	61.....	1,345	99.....	1,445
24.....	1,255	62.....	1,345	100.....	1,445
25.....	1,260	63.....	1,345	101.....	1,450
26.....	1,260	64.....	1,345	102.....	1,450
27.....	1,260	65.....	1,350	103.....	1,460
28.....	1,265	66.....	1,355	104.....	1,460
29.....	1,265	67.....	1,355	105.....	1,475
30.....	1,270	68.....	1,360	106.....	1,475
31.....	1,270	69.....	1,365	107.....	1,495
32.....	1,275	70.....	1,365	108.....	1,495
33.....	1,275	71.....	1,365	109.....	1,510
34.....	1,275	72.....	1,375	110.....	1,555
35.....	1,280	73.....	1,375	111.....	1,595
36.....	1,280	74.....	1,375	112.....	1,600
37.....	1,285	75.....	1,375	113.....	1,605
38.....	1,285	76.....	1,375		

The total weight is 150,690 gr., hence it follows that the average weight obtained is 1,333.54 gr.

According to age the men whose brains were weighed may be grouped as follows :

From 17 to 20 years.....	10 individuals.
“ 21 to 30 “ .....	28 “
“ 31 to 40 “ .....	38 “
“ 41 to 50 “ ..	16 “
“ 51 to 60 “ .....	11 “
65 years.....	2 “
66 “ .....	1 individual.
72 “ .....	1 “
79 “ .....	1 “
Age not given.....	5 individuals.

The average brain-weight for the youngest individuals, i. e. those between 17 and 20 years, was found to be 1,325.5 gr., or very little below the general average (1,333.54 gr.), while the average weight for the five oldest individuals—those between 65 and 79 years—was found to be 1,303 gr. ; but these five individuals showed both comparatively high and low figures, namely, 1,460, 1,155, 1,245, 1,430, and 1,225 gr.

The smallest brain examined (1,040 gr.) occurred in a man 33 years of age, of medium size and in a rather poor state of nutrition, who had died from amebic dysentery complicated with uncinariasis. The largest brain (1,605 gr.) was found in a medium-sized, strongly built man, who had died from tuberculosis and nephritis. The average brain-weight is to be compared with the figures given for other races by a number of authors, and we quote these values from Th. Ziehen's article in *Bardelebens Handbuch der Anatomie*, Jena, 1899, Central Nervensystem, p. 353 :

Author	Nation	No. of Cases	Male	Female
Krause	Hanoverans		1,461	1,341
Bergman	Hanoverans	242	1,372	1,272
Arnold	Badensians		1,431	1,312
Reid	Scotch	87	1,424	1,262
Peacock	Scotch	195	1,423	1,271
Fiederman	Badensians	52	1,412	1,246
Quain	English		1,400	1,250

Bischoff	Bavarians	906	1,362	1,219
Sappey	French	32	1,358	1,256
Parchappe	French		1,323	1,210
Huschke	Saxonians	62	1,358	1,230
Hoffman	Swiss	113	1,350	1,250
Blosfield	Russian	44	1,346	1,195
Buchstal	Russian	44	1,371	1,229
Clendinning	English	80	1,400	1,238
Dieberg	Russian	100	1,328	1,237
Boyd	English	2,086	1,325	1,183
Lelut	French		1,320	
Hamilton	Scotch		1,309	1,190
Meynert	Germ.-Aust.	157	1,296	1,171
Weisbach	Germ.-Aust.	243	1,265	1,112
Techini	Lombards		1,378	1,235
Handmann	Saxonians		1,355	1,223
Marchand	Hessians		1,388	1,252
Doenitz	Japanese	10	1,337	

In his compilation Ziehen gives also a series of figures for the brain-weight of Asiatic, African, and other races according to Davis; but these figures are objectionable, as Ziehen himself states, on account of the fact that they have been computed from the cubical contents of the cranium. The same authority has computed from all the material available an average figure for the European nations, and he gives as the grand average for the male European brain 1,353 gr.; for the female European brain, 1,226 gr. Hence it appears that the average weight of the brain of the Filipino (1333.54) does not fall much below the average weight computed by Ziehen for the European nations.

The relation of the average brain-weight to the average body-weight in the male is variously estimated by various authors from 1:33 to 1:50. Ziehen considers Junker's estimate of 1:42 as the most trustworthy.

We were not in a position in Manila to weigh the bodies from which the brains were obtained, hence we cannot compute any direct brain- and body-weight figure. We can however give an average of the weight of 1,000 male adult Filipinos. All candidates for positions in the light-house, harbor, and other coast service in the Phil-

ippines are examined physically by medical officers of the Public Health and Marine Hospital Service. We are indebted to Dr Manning of this service for a compilation of the weight of 1,000 natives, including, necessarily, many of mixed blood. The average body-weight obtained, therefore, is undoubtedly higher than the average for the pure-blood Filipino, who is quite small in stature and is generally slender, while both Spanish-Filipino and Chinese-Filipino mestizos rather incline to obesity.

The average weight obtained for 1,000 male adults was 122.27 pounds. This would give us a relative brain- and body-weight of about 1:46, but we are convinced that a relative value of 1:40 would be much nearer the truth than the figures obtained from two not well comparable values.

The results of our determinations, provided the figures given have any value as an indicator of the higher mental faculties of man, are certainly not discouraging to those among the Filipinos as well as among the American people who claim that the Filipinos as a people may be educated to the same degree of civilization as the Western nations. In fact it is believed that those who have lived in the islands and who have endeavored to make unbiased observations respecting the mental caliber of the Filipino will not be surprised to learn that the average brain-weight determined is high and that it compares quite favorably with the brain-weights of the European nations.

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